

**AMENDMENTS TO THE CLAIMS**

1. (original) A system of multi-channel shared resistor-string digital-to-analog converters (DACs) comprising:

a multi-channel shared resistor-string digital-to-analog converters for converting multi-channel digital audio input to a multi-channel analog audio output; and

a plurality of high-order low-pass filters for attenuating the residue images of out-of-band noise in said multi-channel analog audio output, thereby reconstructing said multi-channel analog audio output.

2. (original) The system of Claim 1, wherein said multi-channel analog audio signal output includes a multi-channel analog staircase waveform outputs, and said plurality of high-order low-pass filters includes plurality of high-order RC filters.

3. (original) The system of Claim 1, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one voltage level of said shared resistor string, and only one of said 2M digital signal turning on one of said corresponding switch and outputting signal.

4. (original) The system of Claim 3, wherein said switch includes MOS or CMOS.

5. (original) A system of multi-channel shared resistor-string digital-to-analog converters,  
comprising:

an interpolator for converting a multi-channel digital audio input at a sample rate into a multi-channel digital audio output with R multiples of said input sample rate;

a multi-channel shared resistor-string digital-to-analog converters for converting multi-channel digital audio input to a multi-channel analog audio output; and

a plurality of high-order low-pass filters for attenuating the residue images of out-of-band noise in said multi-channel analog audio output, thereby reconstructing said multi-channel analog audio output.

6. (currently amended) The system of Claim 5, wherein said interpolator is a time-sharing interpolator, and said multi-channel analog audio signal output is a multi-channel analog staircase waveform outputs, and said plurality of ~~low-order~~ high-order low-pass filters are a plurality of first order RC filters.
7. (original) The system of Claim 5, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:
- a shared resistor string for providing voltage levels of each channel demand;
  - a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;
  - a plurality of switches connected to said shared resistor string and said plurality of decoders;
- and
- a plurality of buffers for outputting said selected voltage levels;
- wherein each of said plurality of switches corresponds to one voltage level of said shared resistor string, and only one of said 2M digital signal turning on one of said corresponding switch and outputting signal.

8. (original) The system of Claim 7, wherein said switch is MOS or CMOS.

9. (original) A system of multi-channel shared resistor-string digital-to-analog converters, comprising:

a time-sharing interpolator for converting a multi-channel digital audio input at some sample rate into a multi-channel digital audio output with R multiples of said input sample rate;

a multi-channel shared resistor-string digital-to-analog converters for converting said multi-channel digital audio output to a multi-channel analog audio output; and

a plurality of low-order lowpass filters for attenuating the residue images of out-of-band noise in said multi-channel analog audio signal to complete said multi-channel analog audio signal reconstruction output.

10. (original) The system of Claim 9, wherein said multi-channel analog audio signal output is a multi-channel analog staircase waveform outputs, and said plurality of low-order lowpass filters are plurality of first order RC filters.

11. (original) The system of Claim 9, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;

and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one said voltage level of said shared resistor string, and one of said 2M digital signal turning on one of said corresponding switch and then outputting the signal.

12. (original) The system of Claim 11, wherein said switch is MOS or CMOS.

13. (original) A system of multi-channel shared resistor-string digital-to-analog converters, comprising:

an interpolator for converting a multi-channel digital audio input at a sample rate into a multi-channel digital audio output with R multiples of said input sample rate;

a modulator for modulating said multi-channel digital audio output to be a multi-channel digital audio output with a shorter sample wordlength and high-pass quantization noise;

a multi-channel shared resistor-string digital-to-analog converters for converting said multi-channel digital audio output to a multi-channel analog audio output; and

a plurality of filters for attenuating the residue images of out-of-band noise in said multi-channel analog audio to complete said multi-channel analog audio reconstruction output.

14. (original) The system of Claim 13, wherein said interpolator is a time-sharing interpolator, said modulator is a time-sharing sigma-delta modulator, said multi-channel analog audio output is a multi-channel analog staircase waveform outputs, and said plurality of filters are plurality of first order RC filters.

15. (original) The system of Claim 13, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one said voltage level of said shared resistor string, and of one said said 2M digital signal turning on one of said corresponding switch, then outputting the signal.

16. (original) A system of multi-channel shared resistor-string digital-to-analog converters, comprising:

a time-sharing interpolator for converting a multi-channel digital audio input at a sample rate into a multi-channel digital audio output with R multiples of said input sample rate;

a time-sharing sigma-delta modulator for modulating said multi-channel digital audio output to be a multi-channel digital audio output with a shorter sample wordlength and high-pass quantization noise;

a multi-channel shared resistor-string digital-to-analog converters for converting said multi-channel digital audio output to a multi-channel analog audio output; and

a plurality of first order low-pass filters for attenuating the residue images of out-of-band noise in said multi-channel analog audio to complete said multi-channel analog audio reconstruction output.

17. (original) The system of Claim 16, wherein said multi-channel analog audio output is a multi-channel analog staircase waveform outputs.

18. (original) The system of Claim 16, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one of said voltage level of said shared resistor string, and one of said 2M digital signal turning on one said corresponding switch, then outputting the signal.

19. (original) The system of Claim 18, wherein said switch is MOS or CMOS.

20. (currently amended) An output method of multi-channel shared resistor-string digital-to-analog converters, comprising:



converting a multi-channel digital audio input at a sample rate into a multi-channel digital audio output with R multiples of said input sample rate by an interpolator;

modulating said multi-channel digital audio output to be a multi-channel digital audio output with a shorter sample word length and high-pass quantization noise;

transforming said multi-channel digital audio output to a multi-channel analog audio output by using a multi-channel shared resistor-string digital-to-analog converters to; and

attenuating the residue images of out-of-band noise in said multi-channel analog audio to complete said multi-channel analog audio reconstruction output by using a plurality of filters.

21. (original) The output method of Claim 20, wherein said interpolator is a time-sharing interpolator, said modulator is a time-sharing sigma-delta modulator, said multi-channel analog audio output is a multi-channel analog staircase waveform outputs, and said plurality of filters are plurality of first order RC filters.

22. (original) The output method of Claim 20, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one said voltage level of said shared resistor string, and one of said 2M digital signal turning on one of said corresponding switch, then outputting the signal.

23. (original) The output method of Claim 22, wherein said switch is MOS or CMOS.

24. (original) An output method of multi-channel shared resistor-string digital-to-analog converters, comprising:

using an interpolator to convert a multi-channel digital audio input at some sample rate into a multi-channel digital audio output with R multiples of said input sample rate;

using a multi-channel shared resistor-string digital-to-analog converters to convert said multi-channel digital audio output to a multi-channel analog audio output; and

using a plurality of low-order low-pass filters to attenuate the residue images of out-of-band noise in said multi-channel analog audio to complete said multi-channel analog audio reconstruction output.

25. (original) The output method of Claim 24, wherein said interpolator is a time-sharing interpolator, said multi-channel analog audio output is a multi-channel analog staircase waveform outputs, and said plurality of low-order low-pass filters are plurality of first order RC filters.

26. (original) The output method of Claim 24, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one said voltage level of said shared resistor string, and one of said 2M digital signal turning on one of said corresponding switch and outputting the signal.

27. (original) The system of Claim 26, wherein said switch MOS or CMOS.

28. (original) An output method of multi-channel shared resistor-string digital-to-analog converters, comprising:

using a multi-channel shared resistor-string digital-to-analog converters to convert said multi-channel digital audio input to a multi-channel analog audio output; and

using a plurality of high-order low-pass filters to attenuate the residue images of out-of-band noise in said multi-channel analog audio to complete said multi-channel analog audio reconstruction output.

29. (currently amended) The output method of Claim 28, wherein ~~said interpolator is a time-sharing interpolator~~, said multi-channel analog audio signal output is a multi-channel analog staircase waveform outputs, and said plurality of high-order low-pass filters are plurality of high-order RC filters.

30. (original) The output method of Claim 28, wherein said multi-channel shared resistor-string digital-to-analog converters comprises:

a shared resistor string for providing voltage levels of each channel demand;

a plurality of decoders for receiving a M bits modulated digital input signal and then outputting 2M digital signal;

a plurality of switches connected to said shared resistor string and said plurality of decoders;  
and

a plurality of buffers for outputting said selected voltage levels;

wherein each of said plurality of switches corresponds to one said voltage level of said shared resistor string, and one of said 2M digital signal turning on one of said corresponding switch, then outputting the signal.

31. (original) The system of Claim 30, wherein said switch is MOS or CMOS.